

$$8. \int_0^3 \frac{dx}{(1-x)^2} = \int_0^1 \frac{dx}{(1-x)^2} + \int_1^3 \frac{dx}{(1-x)^2}$$



$$\begin{aligned} \lim_{b \rightarrow 1^-} \int_0^b \frac{dx}{(1-x)^2} &= \lim_{b \rightarrow 1^-} \int_0^b (1-x)^{-2} dx \\ &= (1-x)^{-1} \\ &= \lim_{b \rightarrow 1^-} \left. \frac{1}{1-x} \right|_0^b \\ &= \lim_{b \rightarrow 1^-} \left(\frac{1}{1-b} - \frac{1}{1-0} \right) \\ &\quad \downarrow \\ &\quad \infty \end{aligned}$$

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$$10. \quad f(x) = x^3 \quad \text{ave value} = 9$$

$$k = ?$$

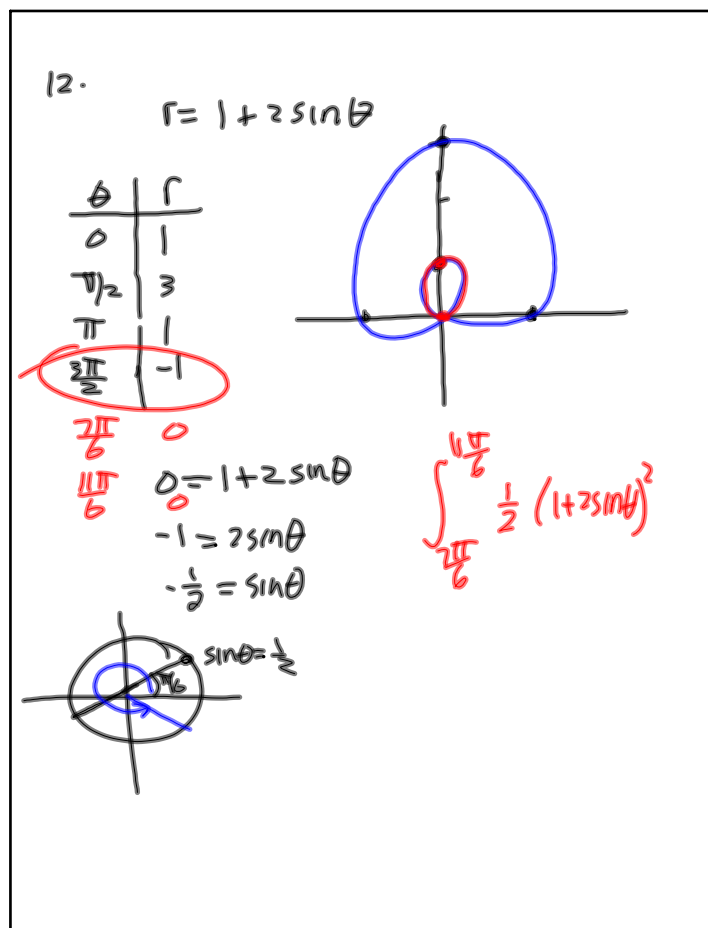
$$[0, k]$$

$$\bar{y} = \frac{1}{b-a} \int_a^b f(x) dx$$

$$9 = \frac{1}{k-0} \int_0^k x^3 dx$$

$$k = 36^{1/3} = \sqrt[3]{36}$$

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review 13 implicit differentiation

implicit expression

{ not solved for y }

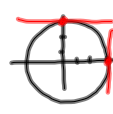
$$x^2 + y^2 = 9$$

could solve this one for y , but
most can't

$$x^3 + 2xy + y^3 - 2y = 7$$

take der term by term

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$$\begin{aligned}
 x^2 + y^2 &= 9 \\
 \text{find } \frac{dy}{dx} &= \\
 2x + 2y y' &= 0 \\
 y' &= \frac{-2x}{2y} = -\frac{x}{y} \\
 \text{slope at } (3,0) & \text{ dne} \\
 (0,3) & m=0 \\
 \text{find } \frac{d^2y}{dx^2} &= \frac{y \cdot f'(x) - x \cdot y'}{y^2} \\
 &= \frac{-y + x \cdot (-\frac{x}{y})}{y^2} \\
 &= \frac{-y^2 - x^2}{y^3} \\
 &= \frac{-9}{y^3}
 \end{aligned}$$


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$$\begin{aligned}
 x^3 - 2xy + y^3 - 2y &= 7 \\
 \text{find } y' & \\
 3x^2 - 2x y' + y \cdot (-2) + 3y^2 y' - 2y' &= 0 \\
 -2xy' + 3y^2 y' - 2y' &= -3x^2 + 2y \\
 y'(-2x + 3y^2 - 2) &= \\
 y' &= \frac{-3x^2 + 2y}{-2x + 3y^2 - 2}
 \end{aligned}$$

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